

# Surface Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



SMC (DO-214AB)

## LINKS TO ADDITIONAL RESOURCES



3D Models

### PRIMARY CHARACTERISTICS

$V_{BR}$	6.8 V to 47 V
$V_{WM}$	5.8 V to 40.2 V
$P_{PPM}$	1500 W
$I_{FSM}$	200 A
$T_J$ max.	185 °C
Polarity	Uni-directional
Package	SMC (DO-214AB)

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

## FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 185$  °C capability suitable for high reliability and automotive requirement
- Available in uni-directional polarity only
- 1500 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
  - Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available

## MECHANICAL DATA

**Case:** SMC (DO-214AB)

Molding compound meets UL 94 V-0 flammability rating  
Base P/NHE3\_X - RoHS-compliant and AEC-Q101 qualified  
Base P/NHM3\_X - halogen-free, RoHS-compliant, and AEC-Q101 qualified  
("X" denotes revision code e.g. A, B, ...)

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

HE3 and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

### MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 $\mu$ s waveform (fig. 3) <sup>(1)(2)</sup>	$P_{PPM}$	1500	W
Peak power pulse current with a 10/1000 $\mu$ s waveform (fig. 1) <sup>(1)</sup>	$I_{PPM}$	See table next page	A
Peak forward surge current 8.3 ms single half sine-wave <sup>(2)(3)</sup>	$I_{FSM}$	200	A
Maximum instantaneous forward voltage at 100 A <sup>(2)(3)</sup>	$V_F$	3.5	V
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +185	°C

#### Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2

<sup>(2)</sup> Mounted on 0.31" x 0.31" (8.0 mm x 8.0 mm) copper pads at each terminal

<sup>(3)</sup> Measured on 8.3 ms single half sine-wave, or equivalent square wave, duty cycle = 4 pulses per minute maximum

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)

DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE $V_{BR}^{(1)}$ AT $I_T$ (V)			TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_R$ ( $\mu\text{A}$ )	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $T_J = 150\text{ }^{\circ}\text{C}$ $I_D$ ( $\mu\text{A}$ )	MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}^{(2)}$ (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)	TYPICAL TEMP. COEFFICIENT OF $V_{BR}^{(3)}$ $\alpha_T$ ( $\%/^{\circ}\text{C}$ )
		MIN.	NOM.	MAX.							
TPSMC6.8A	DEP	6.45	6.80	7.14	10	5.80	1000	10 000	143	10.5	0.047
TPSMC7.5A	DGP	7.13	7.50	7.88	10	6.40	500	5000	133	11.3	0.052
TPSMC8.2A	DKP	7.79	8.20	8.61	10	7.02	200	2000	124	12.1	0.056
TPSMC9.1A	DMP	8.65	9.10	9.55	1	7.78	50	500	112	13.4	0.060
TPSMC10A	DPP	9.5	10.0	10.5	1	8.55	20	200	103	14.5	0.064
TPSMC11A	DRP	10.5	11.0	11.6	1	9.40	5.0	50	96.2	15.6	0.067
TPSMC12A	DTP	11.4	12.0	12.6	1	10.2	2.0	10	89.8	16.7	0.070
TPSMC13A	DVP	12.4	13.0	13.7	1	11.1	2.0	10	82.4	18.2	0.072
TPSMC15A	DXP	14.3	15.0	15.8	1	12.8	1.0	10	70.8	21.2	0.076
TPSMC16A	DZP	15.2	16.0	16.8	1	13.6	1.0	10	66.7	22.5	0.078
TPSMC18A	EEP	17.1	18.0	18.9	1	15.3	1.0	10	59.5	25.2	0.080
TPSMC20A	EGP	19.0	20.0	21.0	1	17.1	1.0	10	54.2	27.7	0.082
TPSMC22A	EKP	20.9	22.0	23.1	1	18.8	1.0	10	49.0	30.6	0.084
TPSMC24A	EMP	22.8	24.0	25.2	1	20.5	1.0	10	45.2	33.2	0.085
TPSMC27A	EPP	25.7	27.0	28.4	1	23.1	1.0	10	40.0	37.5	0.087
TPSMC30A	ERP	28.5	30.0	31.5	1	25.6	1.0	10	36.2	41.4	0.088
TPSMC33A	ETP	31.4	33.0	34.7	1	28.2	1.0	10	32.8	45.7	0.089
TPSMC36A	EVP	34.2	36.0	37.8	1	30.8	1.0	15	30.1	49.9	0.090
TPSMC39A	EXP	37.1	39.0	41.0	1	33.3	1.0	15	27.8	53.9	0.091
TPSMC43A	EZP	40.9	43.0	45.2	1	36.8	1.0	20	25.3	59.3	0.092
TPSMC47A	FEP	44.7	47.0	49.4	1	40.2	1.0	20	23.1	64.8	0.092

**Notes**

- (1)  $V_{BR}$  measured after  $I_T$  applied for 300  $\mu\text{s}$ ,  $I_T$  = square wave pulse or equivalent  
(2) Surge current waveform per fig. 3 and derated per fig. 2  
(3) To calculate  $V_{BR}$  vs. junction temperature, use the following formula:  $V_{BR}$  at  $T_J = V_{BR}$  at  $25\text{ }^{\circ}\text{C} \times (1 + \alpha_T \times (T_J - 25))$   
(4) All terms and symbols are consistent with ANSI/IEEE C62.35

**ORDERING INFORMATION** (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TPSMC6.8AHE3_B/H <sup>(1)</sup>	0.211	H	850	7" diameter plastic tape and reel
TPSMC6.8AHE3_B/I <sup>(1)</sup>	0.211	I	3500	13" diameter plastic tape and reel
TPSMC6.8AHM3_B/H <sup>(1)</sup>	0.211	H	850	7" diameter plastic tape and reel
TPSMC6.8AHM3_B/I <sup>(1)</sup>	0.211	I	3500	13" diameter plastic tape and reel

**Note**

- (1) AEC-Q101 qualified

### RATINGS AND CHARACTERISTICS CURVES ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

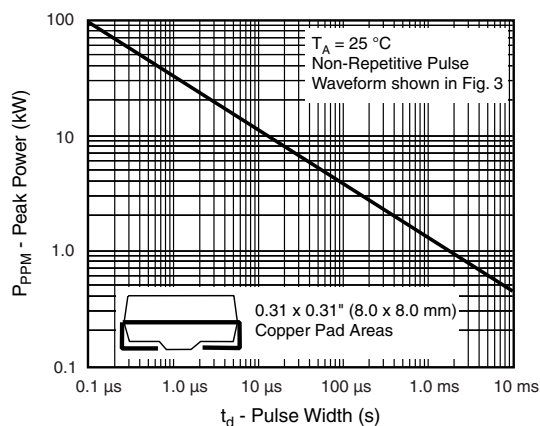


Fig. 1 - Peak Pulse Power Rating Curve

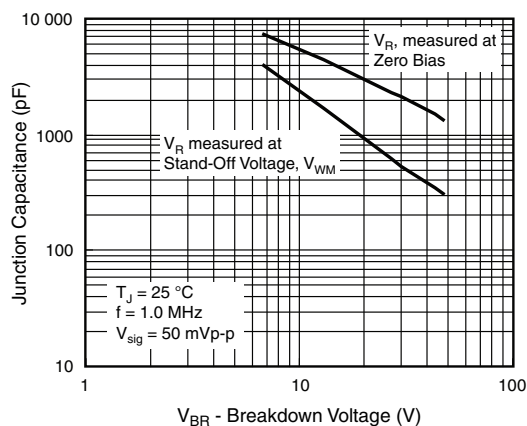


Fig. 4 - Typical Junction Capacitance

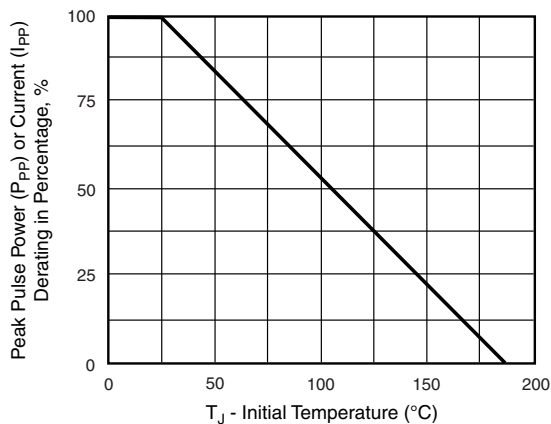


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

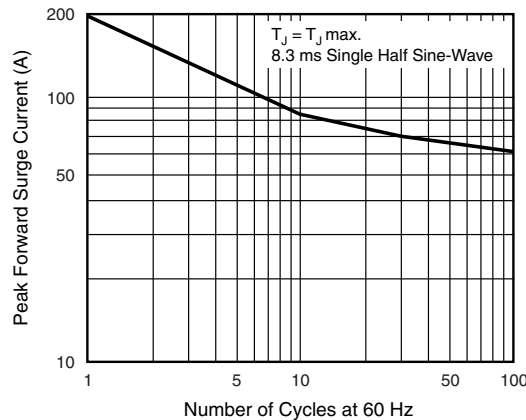


Fig. 5 - Maximum Non-Repetitive Peak Forward Surge Current

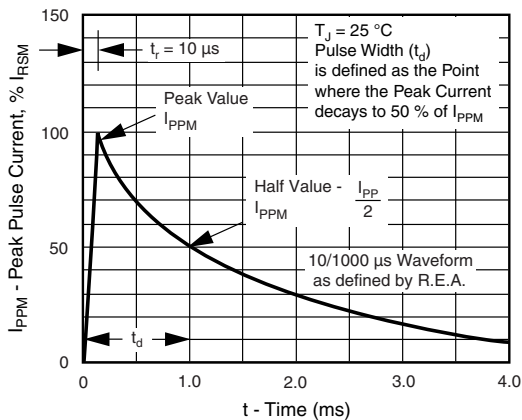
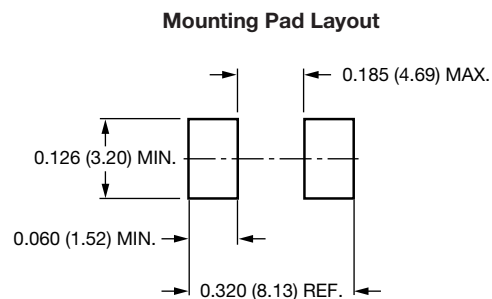
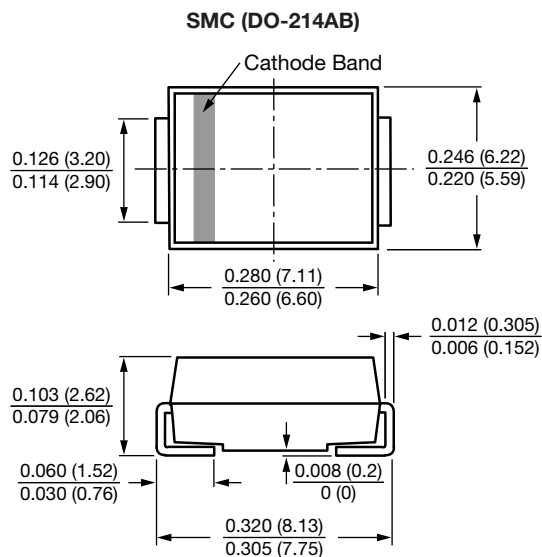


Fig. 3 - Pulse Waveform



## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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